






ORIGINAL RESEARCH

Mentoring for postdoctoral researchers
in rheumatology: the Emerging EULAR
Network (EMEUNET) post-doc
mentoring programme

Javier Rodríguez-Carrio ^{1,2,3}, Polina Putrik ^{4,5}, James Gwinnutt,⁶
Alexandre Sepriano ^{7,8}, Alessia Alunno ⁹, Sofia Ramiro,^{7,10} Jan Leipe,¹¹
Elena Nikiphorou ^{12,13} on behalf of the EMEUNET Working Group

To cite: Rodríguez-Carrio J, Putrik P, Gwinnutt J, *et al.* Mentoring for postdoctoral researchers in rheumatology: the Emerging EULAR Network (EMEUNET) post-doc mentoring programme. *RMD Open* 2020;**6**:e001139. doi:10.1136/rmdopen-2019-001139

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/rmdopen-2019-001139>).

JR-C and PP contributed equally.

Received 31 October 2019
Revised 13 January 2020
Accepted 13 January 2020



© Author(s) (or their employer(s)) 2020. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Dr Javier Rodríguez-Carrio;
javiercarrio@hotmail.com

Dr Polina Putrik;
polina.putrik@gmail.com

ABSTRACT

Objective This study aims to (1) assess the perceived need for a postdoctoral (post-doc) mentoring programme in rheumatology, (2) describe the characteristics and organisational aspects of a pilot mentoring programme implemented by the EMerging European League Against Rheumatism NETwork (EMEUNET) and (3) report mentors' and mentees' evaluation of the pilot programme.

Methods An online survey was conducted among young researchers in rheumatology to evaluate the need and preferred characteristics of a post-doc mentoring initiative. Informed by the survey, a pilot programme was designed and launched. The pilot programme was evaluated with 3-month, 6-month and 12-month surveys and interviews with mentees and a 12-month survey among mentors, after completion.

Results From 275 responses (43 countries, 86% from Europe) collected, analyses were restricted to the target population (total population=158; post-docs (n=103 (65%)) and PhD students (n=55 (35%))). There was a clear need (99% positive responses) for a post-doc mentoring programme. Discussions about current and new projects, and how to lead projects were ranked as priorities in post-doc mentoring. The most desired mentor attribute was generosity and interest in helping (86%), followed by research experience (68%) and having a well-established network (66%). The pilot programme included four mentees (through competitive application) allocated to three mentors. Evaluation surveys and interviews revealed that the programme organisation and content were well appreciated by mentees and mentors.

Conclusions The EMEUNET post-doc mentoring programme addresses unmet need for mentoring, is viable and appreciated by mentors and mentees. The programme structure and content are transferable to other fields where there is need for academic career mentoring.

INTRODUCTION

The postdoctoral (post-doc) stage is a critical phase for early career researchers as they are expected to eventually establish themselves as independent researchers. This means to

Key messages

What is already known about this subject?

► Evidence demonstrates that mentoring can have a successful impact on academic productivity, personal development, efficacy and career progression. It is expected to be highly relevant in the postdoctoral (post-doc) phase, which can be particularly challenging in early career researchers.

What does this study add?

► The EMEUNET Post-Doc Mentoring Programme covers the unmet need for mentoring in early career researchers.
► A pilot programme confirmed the feasibility and utility of a remote post-doc mentoring initiative.

How might this impact on clinical practice?

► A post-doc mentoring programme can help young researchers to boost research productivity in order to advance the field.
► The mentoring programme can help to improve networking and connections, thus strengthening the links among rheumatologists and researchers in the field of rheumatology.

focus their research activities, identify and consolidate their research interests (ie, their own research niche), secure funding and develop their own research groups. The post-doc period is seen as one of the most difficult (and critical) in the academic career ladder.¹ It is not uncommon for researchers in these positions to live on a cycle of short contracts² and/or small bursaries and grants, often with a suboptimal protected time for research. This results in a challenging career phase with large uncertainty and high competition for limited funding. Research is a highly demanding and rapidly evolving field, which requires

new and flexible educational and career-promoting resources other than those provided in the formal (traditional) education structures. Furthermore, while some challenges in research career would expectedly be similar for male and female, gender differences are also not implausible—these can be related to dealing with career breaks due to childbirth, but also, for example, to previously reported gender imbalances in access to research funding.^{3–5} Under such working conditions, having a trusted, experienced senior person who could provide guidance on the right steps in career development could substantially alleviate the tension and facilitate career progression. Ultimately, this could potentially transform the post-doc years into a productive and successful phase in one's academic career.

Mentoring refers to an extended relationship through which a person of advanced professional standing guides a more junior colleague towards career success and professional growth.^{6,7} Academic mentoring means that this relationship is focused on education, research and career goals. Therefore, an academic mentor is someone who has the necessary knowledge to help young researchers to improve the scientific outputs and/or help define career goals in several important domains, including research productivity, networking, career progression, personal development and work–life balance.⁸

Limited evidence from earlier studies in academic medicine has shown that mentoring may have a successful impact on academic productivity, personal development, efficacy and career guidance.^{9,10} However, none of these programmes were focused in the specific setting of the post-doc stage. Studies in the field of rheumatology pointed to limited access to mentoring and potentially unfulfilled mentorship needs, the so-called 'mentoring gap'.^{11,12} While some institutions promote local mentoring (ie, by local staff),^{13–15} finding the right mentor can be challenging, especially in some specific areas or small institutions and even more so outside junior researchers' own institutions. At the same time, researchers are supposed to be strongly embedded in an international research landscape, thus making it even more important to connect with mentors across borders.

In rheumatology, a number of mentoring approaches have been developed by the EMerging EULAR Network (EMEUNET).^{16,17} Among them, a successful programme has been in place for 7 years: the EMEUNET Peer Review Mentoring Programme.¹⁸ This programme covers one of the required skills in research: performing high-quality peer review. Inspired by this success, the EMEUNET team considered evaluating the need and developing a novel mentoring programme focused on the post-doc stage for early career researchers in rheumatology.

The aims of this study were threefold: (1) to assess the need for a post-doc mentoring programme among current post-docs and PhD students (2) to describe the characteristics and organisational aspects of a pilot programme and (3) to evaluate the pilot programme.

MATERIAL AND METHODS

Survey on mentoring needs and preferences among young rheumatology researchers

A cross-sectional survey was conducted to evaluate the need and preferred characteristics of a mentoring initiative helping early career researchers to navigate the post-doc stage. The content of the survey was defined by consensus within the EMEUNET Peer Mentoring subgroup, in collaboration with the EMEUNET Steering Committee. The survey (online supplementary text 1) included 16 questions about the demographics (age and gender), background of the respondents (current position, career stage for post-docs (junior or senior), career path, type of research and disease focus), interest in mentoring (yes vs no), and key areas for mentoring (discussing (1) problems, (2) new projects, (3) how to lead projects, (4) how to build a research network and (5) how to find own research line), mentor profile and preferences on operational aspects of a mentoring programme. To create a priority score for the five key areas for mentoring (see above), respondents were asked to rank the different items from 1 (most important) to 5 (least important). The key areas were then weighted according to the rankings into a priority score (total sum). Where respondents did not provide a rank, zero weight was assigned. For feasibility reasons (survey length) the survey did not cover some other potentially relevant question about participants' background, for example, previous research mobility or participation in other mentoring programmes.

The survey was embedded in the SurveyMonkey online system and an invitation to complete the survey was emailed to all EMEUNET members (database containing >1600 members at that time) and advertised on social media platforms (Facebook and Twitter). Responses were collected between 8 August and 11 October 2017.

Analyses were limited to a target group that included post-docs (the actual target population for post-doc mentoring interventions) or PhD students (this is a potential, future target population). For the purpose of this survey a 'post-doc' was regarded as a fellow who had followed a PhD programme, leading to its completion and the graduation as a PhD, regardless of the academic background (MD or non-MD) obtained and the stage of clinical training. A 'PhD student' was used for any fellow who is currently pursuing a PhD programme, regardless of the academic background and the stage of clinical training. Similarly, those selecting 'physician in training' or 'attending physician' were considered as having a clinical background. Data were summarised using descriptive statistics. Comparisons between post-docs and PhD students were done using the χ^2 or Fisher's exact test, as appropriate. Logistic regression was used to assess the association between gender and top priorities for the mentoring programme expressed by the respondents. Interactions with gender were assessed during the analyses and stratification was performed if a significant interaction was detected.

All analyses were performed using Stata V.14.¹⁹ Permission from the mentees and mentors participating in the programme to analyse and anonymously report the surveys was obtained.

Evaluation of the pilot edition of the post-doc mentoring program

Informed by the survey results, a 12-month post-doc mentoring initiative was developed and piloted (details presented in the Results section). Potential mentors were identified as top leaders in the field of rheumatology who matched the profile retrieved from the survey. A list of candidate mentors was defined by the organisers (Peer Mentoring subgroup members and Steering Committee) and official invitations were sent. An individual development plan (IDP), a document defining mentees' goals for the mentoring programme, was used for a baseline assessment of the mentees and served as a start for communication with mentor. Next, regular blinded evaluations (mentors and mentees were not aware of each other's answers) were performed in the form of short surveys to mentees (at 3, 6 and 12 months) and mentors (at 12 months) (using Qualtrics Software),²⁰ as well as qualitative interviews with mentees on completion of the programme. Qualitative interviews included open questions about their experience of the programme, the frequency of communication in the mentor-mentee pairs, progress on achievement of the goals set for the year, overall satisfaction and an open question at the end for any other comments for

improvement. Data from the IDPs and the regular surveys were extracted and analysed using descriptive statistics. Major themes emerging from the interviews were identified and summarised narratively.

RESULTS

Survey on mentoring needs and preferences among young rheumatology researchers

A total of 275 responses from 43 countries (n=237 (86%) from Europe) were collected. Among these, 103/275 (38%) came from post-docs, 55 (20%) from PhD students, 66 (24%) from training physicians, 66 (24%) from attending physicians, 27 (10%) from senior researchers and 16 (6%) from other career positions. Analyses were restricted to those identified as post-docs or PhD students (n=158) (table 1), as they were the target (primary and future, respectively) population of the present study. The PhD students were more likely to have a clinical background and to be in training, but differences did not reach statistical significance. A quarter of the post-docs had a clinical background. Most of the post-docs were in their first 3 years after PhD graduation (n=60 (60%)). Just over half of post-docs (n=55 (53%)) were interested in a career path as a physician scientist or a researcher as their primary goal. A heterogeneous background in terms of research areas and diseases of interest was observed among respondents (online supplementary table 1).

Table 1 Demographics of survey respondents

	Total respondents	Post-docs	PhD students	P value
N	158	103	55	
Age in years, N (%)				<0.01
≤29	28 (18)	12 (12)	16 (29)	
30–34	73 (46)	46 (45)	27 (49)	
35–39	47 (30)	39 (38)	8 (15)	
≥40	10 (6)	6 (6)	4 (7)	
Gender, N (%)				0.65
Men	51 (32)	32 (31)	19 (37)	
Women	107 (68)	71 (69)	36 (66)	
Region, N (%)				0.35
Europe	143 (91)	93 (90)	50 (91)	
The Americas	1 (1)	0 (0)	1 (2)	
Easter Mediterranean Region	14 (9)	10 (10)	4 (7)	
Clinical practice, N (%)	45 (29)	25 (24)	20 (36)	0.11
Physician in training	23 (15)	11 (10.7)	12 (22)	
Attending physician	22 (14)	14 (13.6)	8 (14.6)	

Demographic features of the survey respondents were summarised as N (%). Countries were grouped according to United Nations (UN) regions. Clinical practice means the proportion of respondents with clinical duties. Differences between post-docs and PhD students were assessed by χ^2 tests. Europe: Albania, Austria, Armenia, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, UK, France, Greece, Germany, Hungary, Italy, Ireland, Moldova, The Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Slovenia, Ukraine, Iceland, Lithuania, Switzerland, Serbia, Turkey, Israel. The Americas: Canada, USA, Colombia, Ecuador, Peru. Eastern Mediterranean Region: Egypt, Morocco, Tunisia, Lebanon.

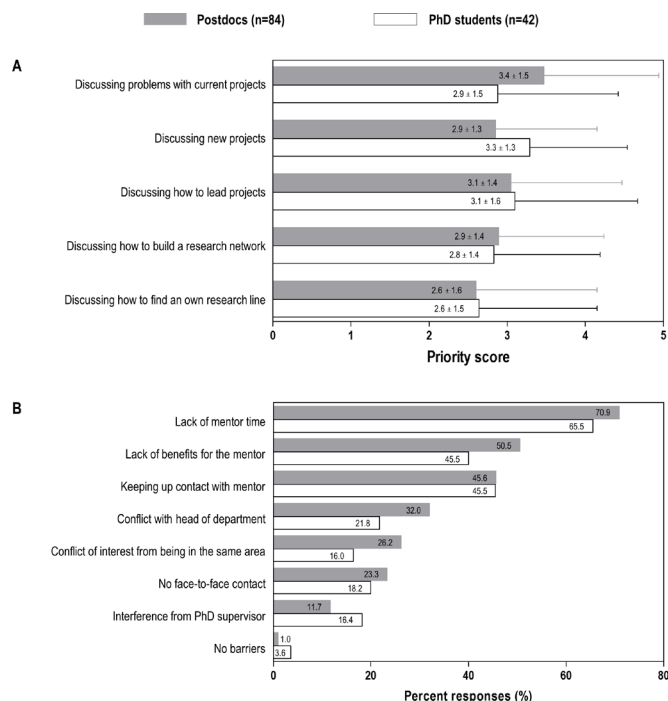


Figure 1 Characteristics of a mentoring programme. (A) Priorities of a mentoring programme. Respondents were asked to rank five potential items according to their priority to be included in a mentoring programme from 1 (top priority) to 5 (last priority). See the Data analysis section for methods to calculate priority scores. Bars represent mean and SD for each item (also included as bars label). These scores were calculated from the 126 respondents who answered this question. (B) Potential barriers to the success of a mentoring programme. Summary of the potential barriers to the success of a mentoring programme (multiple responses were allowed). The vertical axis represents the per cent of responses (indicated as bars label) collected for each item from the 158 respondents.

Among the post-doc/PhD student respondents (126/158), the vast majority (99%) stated there is a need for a mentoring programme specific to post-docs.

When asked about the priorities of such a mentoring programme, discussions about current projects, new projects and how to lead projects were ranked in the top positions (figure 1A), with slight differences between post-docs and PhD students: whereas the first one was ranked as the top priority for post-docs, the PhD students prioritised the last one.

Separate analyses by gender revealed that whereas post-doc men clearly prioritised ‘discussing problems with current projects’ (n=12/28 (43%)) over ‘discussing how to lead projects’ (n=6/28 (21%)) and ‘discussing how to build a research network’ (n=5/28 (18%)) as the top priority, a more balanced situation was observed for women (‘discussing problems with current projects’: n=14/56 (25%), ‘discussing how to lead projects’: n=14/56 (25%) and ‘discussing how to find an own research line’: n=13/56 (23%)). Concerning PhD students, women were more likely to choose ‘discussing how to find their own research line’ and less likely to select ‘discussing how to lead projects’ as first priority compared with their men counterparts (online supplementary table 2).

Regarding the profile of an ideal mentor, the most desired attribute was generosity and interest in helping, followed by research and networking aspects (table 2). Concerning the potential uses of the mentoring programme, ‘developing research ideas’ and ‘career plans’ emerged as the most common potential use overall, although post-docs emphasised the need for help with grant writing (table 3).

Preferred mentor–mentee communication methods were email (67%) and face-to-face meetings at conferences (47%). The majority of the respondents preferred a frequency of once per month (36%) or every 3 months (28%). The optimal duration for such a programme was found to be 12 (43%) or 24 months (47%). The potential obstacles for the success of the programme were summarised in figure 1B, the most important being related to mentor availability, without differences by gender or career stages.

Table 2 Skills and attributes expected from a mentor

	Total respondents, N (%)	Post-docs, N (%)	PhD students, N (%)	P value
N (total)*	128	86	42	
Generosity and interest in helping	110 (86)	72 (84)	38 (91)	0.30
Vast research experience	86 (67)	60 (70)	26 (62)	0.37
International network	85 (66)	53 (62)	32 (76)	0.10
Successful grants	80 (63)	56 (65)	24 (57)	0.38
Balanced dedication between research, clinical work, training, management	62 (48)	36 (42)	26 (62)	0.03
Leadership position	41 (32)	28 (33)	13 (31)	0.86
Editorial experience	28 (22)	18 (21)	10 (24)	0.71
Experience outside academia	24 (19)	20 (23)	4 (10)	0.06

Respondents were asked to indicate their preferred skills and attributes of a mentor from those given in the list. Multiple responses were allowed. N (%) for each item was calculated. Differences between post-docs and PhD students were assessed by χ^2 tests.

*30 respondents did not answer question regarding skills and attributes expected from a mentor. The exclusion of these 30 respondents did not significantly change the baseline characteristics of the group.

Table 3 Ways in which respondents would use mentoring

	Total respondents, N (%)	Post-docs, N (%)	PhD students, N (%)	P value
N*	128	86	42	
Developing research ideas	79 (62)	46 (54)	33 (79)	<0.01
Career development plan	69 (54)	43 (50)	26 (62)	0.21
Help with grant writing	67 (52)	48 (56)	19 (45)	0.26
Insight into career path	65 (51)	39 (45)	26 (62)	0.08
Access to resources outside of own institution	65 (51)	38 (44)	27 (64)	0.03
Goal setting	59 (46)	38 (44)	21 (50)	0.54
Help with networking	58 (45)	33 (38)	25 (60)	0.02
Mentoring expertise that cannot be found in own institution	53 (41)	37 (43)	16 (38)	0.60
Advice on when to say no	44 (34)	29 (34)	15 (36)	0.82
Help with teaching	40 (31)	25 (29)	15 (36)	0.45
Work/life balance	39 (31)	27 (31)	12 (29)	0.77
Visit mentor's lab	37 (29)	26 (30)	11 (26)	0.64
Advice on time management	37 (29)	26 (30)	11 (26)	0.64
How to structure research team	32 (25)	21 (24)	11 (26)	0.82
Help with job search	30 (23)	23 (27)	7 (17)	0.21
Getting a job at the mentor's institution	28 (22)	17 (20)	11 (26)	0.41
Help navigate political situations	27 (21)	21 (24)	6 (14)	0.19
Advice on switching careers	23 (18)	16 (19)	7 (17)	0.79
Help with contract negotiations	20 (16)	16 (19)	4 (10)	0.21†
Developing a business plan	10 (8)	8 (9)	2 (5)	0.30†
Advice on hiring staff	7 (6)	7 (8)	0 (0)	0.06†
Advice on setting up solo practice	3 (2)	1 (1)	2 (5)	0.25†

Respondents were asked to indicate in what ways they would use mentoring. Multiple responses were allowed. N(%) for each item was calculated. Differences between post-docs and PhD students.

*30 respondents did not answer question regarding ways in which they would use mentoring. The exclusion of these 30 respondents did not significantly change the baseline characteristics of the group.

†p-value from Fisher exact test.

Finally, in order to explore whether potential mentoring needs may be found within Europe, the mentoring priorities, the profile of an ideal mentor and the potential mentoring barriers were compared between Western European countries compared with their Eastern counterparts (online supplementary tables 3–5). Overall, a common picture was observed, although networking and international experience were more appreciated in Eastern countries, where less barriers were also perceived.

The EMEUNET Post-Doc mentoring programme: structure and characteristics

Informed by the results of the survey, the EMEUNET Peer Mentoring subgroup in collaboration with the EMEUNET Steering Committee launched the EMEUNET Post-Doc Mentoring Programme in June 2018.²¹

The organisation of the programme is summarised in figure 2. Briefly, three mentors were identified and invited to participate. An open call (including a brief description of the mentors' research interest and

keywords) directed to post-docs was launched and advertised among EMEUNET members via email and social media platforms. The applicants were allowed to select the mentor of their interest, and the organisers had no role in the mentor–mentee pairing. Four applicants were selected based on their background, career profile and motivation after a competitive process. Selected applicants (mentees) and mentors were introduced by email and a first face-to-face meeting was scheduled at the 2018 EULAR Annual Congress. These 1-hour meetings were organised by members of the Peer Mentoring group, and a meeting agenda was defined prior to the meetings to ensure consistency among the mentor–mentee pairs. A member of the Peer Mentoring group was always present to open the meetings and guide the first steps of the introductory meetings. During these meetings, the programme structure and materials (ie, the IDP) were introduced. The IDP represents an essential tool for mentees to assess current skills and interests, make

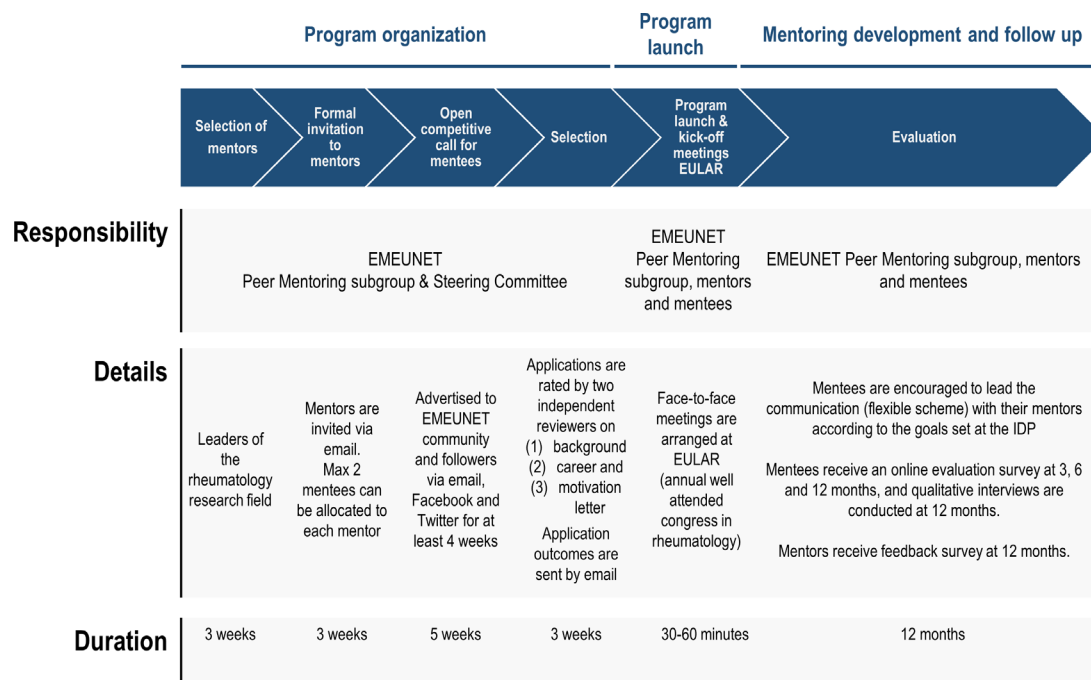


Figure 2 Structure of the EMEUNET Post-Doc Mentoring Programme. The procedures followed in the programme are indicated in the flow chart, including the responsible persons involved in each step, the description of the tasks to be completed as well as the expected duration of each stage. EMEUNET, EMerging EULAR Network; EULAR, European League against rheumatism; IDP, individual development plan.

future plans and goals, and enhance communication with mentors. The IDP was divided into three sections: (1) background and previous mentoring activities (open fields), (2) self-assessment on several domains (scientific knowledge, research skills, communication, professionalism, management and leadership skills, responsible conduct of research and career planning) (5-points Likert scales) and (3) mentorship plan (including short-term career plans) (open fields). During the face-to-face meeting, the mentor and the mentee discussed the aims proposed by the mentee within their IDPs and how the guidance of the mentor may help achieve these. Therefore, the IDP served as the communication tool to help set the goals of the mentorship.

The EMEUNET Post-Doc mentoring programme: evaluation of programme outcomes

Findings from the IDPs (baseline assessment) as well as from 3, 6 and 12 months follow-up mentees' surveys supplemented by qualitative interviews revealed that mentees greatly appreciated the programme and the opportunity to connect with a mentor. None of the four participants had an external mentor before entering the programme, whereas the satisfaction with the local mentors (mentors from own institution) varied from unsatisfactory (1/4), moderate or satisfied (2/4) to very satisfactory (1/4). All mentees stated that their career aspiration was to have an academic career and most (3/4) stated that they wanted to improve their skill set. Concerning the self-assessments, the mentees rated themselves high in professionalism and responsible research, whereas career planning skills, management

and leadership were the domains with lower scorings (figure 3A).

The mentees acknowledged that the introductory face-to-face meetings helped to establish the first contact with the mentor and get initial guidance and new perspectives on the career development (3/4) and gain confidence to communicate with the mentor later on (3/4). Number and content of contacts during the year varied substantially and depended on the needs and proactivity of the mentees without major changes during a follow-up (figure 3B). Most of the interactions were done via email. Mentors were responsive, and there were no issues of poor communication or lack of reaction. Mentors were able to address all the questions about career priorities and choices raised by mentees (2/4 somewhat agreed and 2/4 strongly agreed at 12 months). However, it was also mentioned that mentors were not able to address country-specific problems. The discussions with the mentors seemed to have an effect on mentees' confidence (figure 3B) and all mentees agreed that the programme helped in defining future career plans. All the mentees reported changes in their IDPs since the inception of the programme. Overall, a notable progress towards achieving the goals set in the IDP at baseline by the mentees was observed during a follow-up (figure 3B).

Two mentees (2/4) shared that they would like to be more supported throughout the year with some planned interactions or other ways of structuring communication. Clarifying the expectations of mentors and mentees, such as by developing a short guide to be shared with everyone involved from the start, was also suggested.

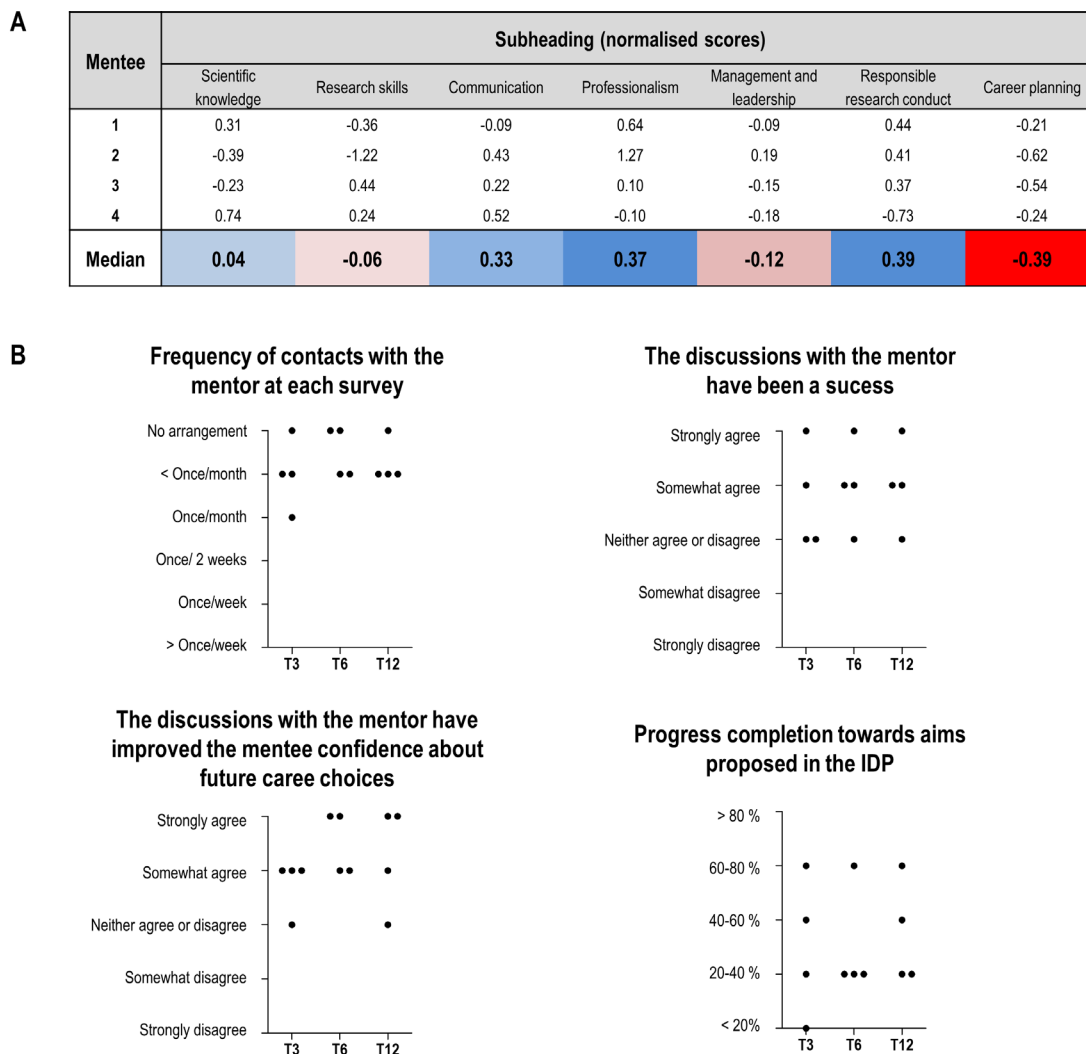


Figure 3 Summary of the evaluation of the programme outcomes. (A) Analysis of the mentees' self-assessment subheadings listed in the IDPs. Since notable differences were observed for each individual self-rates, individual scores were normalised by subtracting the individual mean from each item). Individual (from each mentee) and median average normalised scores for each subheading of the self-assessment section are shown in the table. Median tiles are coloured according to values (red: lowest values, blue: highest values). (B) Responses retrieved from the follow-up surveys are shown in graphs. Each dot represents one mentee. Y-axes illustrate the given responses and X-axes represent the different time-points (T3, T6 and T12 denoting 3, 6 and 12 months surveys). IDP, individual development plan.

Mentees suggested that one or two mentees per mentor felt optimal, mentioning that having the first discussion with other mentees would be insightful and mind-opening. All mentees were confident they could also approach their mentor after the programme termination, suggesting potential long-lasting effects of the programme. Overall, the mentoring experience was enriching for all mentees (2/4 strongly agreed and 2/4 agreed that they were satisfied with the programme, with minor changes along follow-up) and all mentees would recommend the programme. The enriching effect of the programme and the positive feedback on it were evident in the testimonials as part of the final surveys (online supplementary table 6).

Finally, mentors' surveys on completion of the programme (12months time point) showed that mentors were positive about the programme purpose

and implementation (programme rated from average to excellent), as well as with the mentor–mentee fit (from good to excellent). However, the frequency of the contacts appeared to be less intensive than expected, and questions remained as to whether mentees used the programme to its full potential. When contacts did happen, mentors were happy about their content and nature. One of the mentors recommended to implement additional instructions for mentees not interacting at the full potential of the programme, whereas other mentor showed preference for a more flexible programme, with additional room for spontaneity and improvisation.

DISCUSSION

Mentoring can be seen as an important contributor towards success in an academic career,^{9 10 22} is relatively

easy to implement and was suggested to be cost-effective in some settings.^{9 10 22–26} In recent years, there is a growing interest in incorporating mentoring into academia.^{24 27} In line with this, the need for mentoring was the second most commonly reported theme identified in a survey in physician–scientists working in the USA.²⁸ The post-doc phase for early career researchers in academia is a challenging period where mentor support could be of high value and impact; however, such mentoring programme are lacking. In fact, mentoring programme and dedicated sessions were reported as preferred formats for career development and research training initiatives, compared with other traditional formats such as webinars or video lectures.²⁸ Consequently, and due to the themes emerged from our survey that can be addressed by mentoring, the programme herein reported will optimally fit the early post-doc stage, to ensure a smooth transition as an independent, senior researcher. To the best of our knowledge, this is the first assessment of the post-doc mentoring needs in the field of rheumatology in Europe. It is also the first report on a pioneering mentoring programme, described from its development right through to implementation and evaluation. The findings herein presented may serve as a starting point for similar initiatives to be developed, also in other fields.

Our survey revealed that the vast majority of the target population were interested in such a programme. Developing leadership skills, opening new research projects and grant writing, together with gaining insight into career paths, help in career development and goals setting were the most demanded priorities for mentoring. Although not focused on post-docs, a similar picture was observed in mentoring schemes in the USA.^{26 28 29} These skills are not usually covered by the formal education schemes (ie, the established curricula), reinforcing the added value of mentoring programme targeting the development of such skills. Additionally, gaining insight into career paths, help in career development and goals setting were highly ranked in our survey, which is in accordance with a recent survey conducted among junior rheumatologists in the USA.²⁶ In contrast, negotiating a job contract and job search received a low interest in our survey compared with that of performed in the USA,²⁶ which may be the result of different job markets. However, to what is concerned at career topics and barriers perceived, the need for mentoring was relatively similar.

Overall, a balanced distribution in the preferences and priorities was perceived among respondents, with minor differences by gender. Previous surveys have demonstrated that women were interested in establishing mentoring relationships at an equal or slightly higher frequency than men and the breadth of the ‘mentoring gap’ is similar between genders.^{30 31} However, it is of utmost relevance to ensure diversity in mentoring, a balanced gender representation among mentors and, more importantly, to offer flexible mentoring with a broad scope. In this scenario, the mentee

should be playing a crucial role in setting the specific aims of the mentoring. Being proactive and committed were mentee’s characteristics attributed to a successful mentoring experience in a focus group study.²⁶ Consequently, the mentoring programme should be conceived as flexible structures, and the mentees should be the driving force of the relationship.³²

The needs assessment survey formed the basis of further consultations with stakeholders and experts, and led us to launch a pilot version of the EMEUNET Post-Doc Mentoring Programme. In contrast to other mentoring approaches, entry to this programme was based on a competitive open call. Acknowledging the importance of mentor–mentee matching for a successful mentoring relationship,^{6 33} the mentees were allowed to select the mentor (from the provided list) that best fitted their expectations. The overall satisfaction with the mentors’ feedback and the mentoring experience confirmed that this approach was satisfactory for both parts, and no mismatches were signalled. The expectations, career plans and profile of the participants at programme entry fitted with the target population, hence supporting the adequacy of this application and selection process. Further, the programme was conceived as a remote mentoring experience, which benefits diversity, facilitates the access to mentoring of all community members regardless of their local possibilities, promotes access to well-known experts (a major current unmet need),²⁶ and avoids potential conflicts with local competitors.²⁶

Navigating a remote programme with a flexible structure can be challenging, especially in the absence of previous successful mentoring.²⁶ Introductory forms, templates or dedicated information materials have been advocated to overcome such challenges^{6 34} although most initiatives do not make use of these documents. In line with this, we developed our own IDP as a systematic document covering the whole mentoring process. IDP allows the mentees to identify their skills and weaknesses and set goals for the short and mid-term, thus facilitating communication and balancing mutual expectations. Although relatively similar templates have been reported for other settings (thesis or promotion committees, mentoring contracts, etc)^{34 35} for specific steps, to the best of our knowledge, this is the first time that an IDP with a detailed structure has been implemented and conceived as an ‘anchor’ guide for a mentoring programme. In a remote mentoring context, the IDP has a pivotal role as it provides structure, plan and input for mentor–mentee interactions.

The results of our survey delineated the profile of an ideal mentor that mirrored those observed in previous initiatives.^{26 32 36} Interestingly, the most important perceived barriers were the lack of mentor time and commitment. This is in accordance with the current literature, where time pressures²⁶ and lack of commitment³² are reported as important limitations for successful mentoring. Although most mentors devote

their efforts in an altruistic way, this is suboptimal and represents a central challenge due to the relevance of mentoring for the academic path and the benefits of mentoring on mentors' performance and productivity.²⁴ In fact, the lack of tangible rewards for mentoring was identified as the greatest barrier in a recent focus group²⁶ and in previous works.^{28 37 38} Taken together, all these observations underline the need for mentoring to be recognised as a professional duty and hence, be included in the mentors' own portfolio. As such, the organisation of official mentoring programme and the participation of international societies and allied institutions must be considered to provide an official framework. The need of formal cross-institutional mentoring networks also emerged from a mixed-method study in the USA.²⁸ In this sense, the mentorship programme by the British Society of Rheumatology provides a good example.³⁹ Involving national societies may contribute to maximise the mentoring experience by engaging mentors with distinct expertise and profiles, which may further lead to positive outcomes, for example, in terms of opportunities for networking and diversity for the mentee,^{29 40} and reduced time pressures for mentors. Since the mentoring needs and preferences of the mentees and the profiles of the mentors observed in our survey are equivalent to those observed in other countries, such as the USA, this article may pave the ground for international collaborations in mentoring programme using the programme development described here as a template.

Evaluation of the pilot programme proved that this programme was viable and appreciated by both mentors and mentees, and demonstrated that overall, the developed format works well. Potential programme improvements could be in developing supporting guides to clarify the expectations at the start of the programme, as well as providing some additional communication structure during the year to encourage continual communication, always keeping a flexible format.

Although the survey sample in this study may not be necessarily representative, the fact that it was advertised through EMEUNET maximises the likelihood of a substantial proportion of active young researchers in the field being reached. However, a potential responder bias may be expected as researchers interested in mentoring would likely be more prone to complete the survey. Notably, more females participated which may reflect the gender structure of young rheumatology researchers or indicate a gender bias in survey response.^{41 42} It is important to note that, in the absence of validated questionnaires or objective measures, the needs and preferences around mentoring, as well as satisfaction with the mentoring programme in the pilot programme were measured with self-composed non-validated questionnaires. Another limitation of the study is the size of the pilot programme with only four participants. However, it must be considered that it represents a proof of concept edition aimed, in part, at

assessing the implementation and functioning of such a pioneer initiative. Larger-scale assessments of the target population and comprehensive evaluations of existing and future programme (including face-to-face mentorship programme) are needed.

In summary, we report an assessment of the mentoring needs and preferences of post-doc researchers in the field of rheumatology, the implementation of a pilot programme and an evaluation of its outcomes. The EMEUNET Post-Doc Mentoring Programme covers the unmet need for mentoring in early career researchers, confirming the feasibility and utility of an international, remote mentoring initiative. A formal evaluation of the objective efficacy of the mentoring programme remains challenging, due to the lack of objective outcomes measurements,²² and the scarcity of long-term data on the value, sustainability and impact of such programmes. Through this article, we wish to inspire the implementation of similar programmes and the collaboration among international societies and research institutions to develop such programmes under official frameworks, and to transfer the programme principles into other fields beyond rheumatology.

Author affiliations

¹Area of Immunology, Universidad de Oviedo, Oviedo, Spain

²Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), Asturias, Spain

³Bone and Mineral Research Unit, Instituto Reina Sofía de Investigación Nefrológica, REDinREN del ISCIII, Hospital Universitario Central de Asturias, Oviedo, Spain

⁴CAPHRI, Maastricht University, Maastricht, The Netherlands

⁵Department of Internal Medicine, Division of Rheumatology, Maastricht University Medical Center, Maastricht, The Netherlands

⁶Centre for Epidemiology Versus Arthritis, Centre for Musculoskeletal Research, Division of Musculoskeletal and Dermatological Sciences, School of Biological Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester, UK

⁷Department of Rheumatology, Leiden University Medical Center, Leiden, The Netherlands

⁸NOVA Medical School, Universidade Nova de Lisboa, Lisbon, Portugal

⁹Rheumatology Unit, Department of Medicine, University of Perugia, Perugia, Italy

¹⁰Zuyderland Medical Center, Heerlen, The Netherlands

¹¹Division of Rheumatology and Clinical Immunology, Medizinische Klinik and Poliklinik IV, University of Munich, München, Germany

¹²Centre for Rheumatic Diseases, Department of Inflammation Biology, School of Immunology and Microbial Sciences, Faculty of Life Sciences & Medicine, King's College London, London, UK

¹³Department of Rheumatology, King's College Hospital, London, UK

Correction notice The article has been corrected since it was published online. The co-author James Gwinnutt's surname was misspelled as Gwinnut which has been amended now.

Twitter Javier Rodríguez-Carrio @javierrcarrio and Elena Nikiphorou @ElenaNikiUK

Acknowledgements We would like to thank all mentees and mentors involved in the first edition of this program for their participation, as well as all the young researchers in rheumatology who responded to our online survey.

Contributors JR-C, PP, JG, AS, AA, SR, JL and EN contributed to the design of the study, interpretation and discussion of the results. JR-C, PP, JG and EN drafted and edited the manuscript. All authors read and approved the final version of the manuscript.

Funding JR-C is supported by a postdoctoral contract ('Juan de la Cierva - Incorporación' programme, reference IJCI-2017-32070) from the Ministry of Science, Universities and Innovation (Spain). JG is currently supported by a grant from Bristol Myers Squibb. AS is supported by a doctoral grant from 'Fundação

para a Ciência e Tecnologia' (SFRH/BD/108246/2015). AA is supported by a grant from the European Commission (HarmonicSS GA 731944).

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval No ethical approval was required since the study presents results of an anonymised online survey with non-identifiable information.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. Survey dataset will be made available on request to the authors. The rest of the study did not result in datasets generated.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Javier Rodríguez-Carrio <http://orcid.org/0000-0002-0011-5102>

Alexandre Sepriano <http://orcid.org/0000-0003-1954-0229>

Alessia Alunno <http://orcid.org/0000-0003-1105-5640>

Elena Nikiphorou <http://orcid.org/0000-0001-6847-3726>

REFERENCES

- Ross RG, Greco-Sanders L, Laudenslager M. An institutional postdoctoral research training program: increasing productivity of postdoctoral trainees. *Acad Psychiatry* 2016;40:207–12.
- Etchells P. The human cost of the pressures of postdoctoral research. *The Guardian* 2017.
- Tamblyn R, Girard N, Qian CJ, et al. Assessment of potential bias in research grant peer review in Canada. *Can Med Assoc J* 2018;190:E489–99.
- Lancet. Gender gaps in research funding are due to less favorable assessment of women, not their science. *Lancet* 2019.
- Witteman HO, Hendricks M, Straus S, et al. Are gender gaps due to evaluations of the applicant or the science? A natural experiment at a national funding agency. *Lancet* 2019;393:531–40.
- Moorthy LN, Muscal E, Riebschleger M, et al. Efficacy of an Interinstitutional mentoring program within pediatric rheumatology. *Arthritis Care Res* 2016;68:645–51.
- Sambunjak D, Marusic A. Mentoring: what's in a name? *JAMA* 2009;302:2591–2.
- UKGuardianship. What is academic mentoring? *UKGuardianship blog* 2017.
- Sambunjak D, Straus SE, Marusic A. A systematic review of qualitative research on the meaning and characteristics of mentoring in academic medicine. *J Gen Intern Med* 2010;25:72–8.
- Sambunjak D, Straus SE, Marusic A. Mentoring in academic medicine: a systematic review. *JAMA* 2006;296:1103–15.
- Nigrovic PA, Muscal E, Riebschleger M, et al. AMIGO: a novel approach to the mentorship gap in pediatric rheumatology. *J Pediatr* 2014;164:226–7.
- Patwardhan A, Henrickson M, Laskosz L, et al. Current pediatric rheumatology fellowship training in the United States: what fellows actually do. *Pediatr Rheumatol Online J* 2014;12:8.
- Monash University. Mentorship program. Available: <https://www.monash.edu/medicine/ccs/research/emcr/mentoring>
- Kohn H. A mentoring program to help junior faculty members achieve scholarship success. *Am J Pharm Educ* 2014;78:29.
- Shollen SL, Bland CJ, Center BA, et al. Relating mentor type and mentoring behaviors to academic medicine faculty satisfaction and productivity at one medical school. *Acad Med* 2014;89:1267–75.
- Gaujoux-Viala C, Knevel R, Mandl P, et al. Who are the young professionals working in the field of rheumatology in Europe and what are their needs? An EMEUNET (emerging EULAR network) survey. *Ann Rheum Dis* 2012;71:1432–3.
- Frank-Bertoncelj M, Hatemi G, Ospelt C, et al. Mentoring of young professionals in the field of rheumatology in Europe: results from an EMerging EULAR NETWORK (EMEUNET) survey. *Clin Exp Rheumatol* 2014;32:935–41.
- Rodríguez-Carrio J, Putrik P, Sepriano A, et al. Improving the peer review skills of young rheumatologists and researchers in rheumatology: the EMEUNET peer review mentoring program. *RMD Open* 2018;4:e000619.
- StataCorp. *Stata statistical software: release 14*. College Station, TX: StataCorp LP, 2015.
- Qualtrics. Qualtrics. Provo, UT, 2019. Available: <https://www.qualtrics.com>
- EMEUNET working group. EMEUNET Post-doc mentoring program. Available: https://emeunet.eular.org/emeunet_peer_mentoring_sg_post_doc_mentoring_program.cfm
- Kashiwagi DT, Varkey P, Cook DA. Mentoring programs for physicians in academic medicine: a systematic review. *Acad Med* 2013;88:1029–37.
- Wingard DL, Garman KA, Reznik V. Facilitating faculty success: outcomes and cost benefit of the UCSD national center of leadership in academic medicine. *Acad Med* 2004;79:S9–11.
- Eisen S, Sukhani S, Brightwell A, et al. Peer mentoring: evaluation of a novel programme in paediatrics. *Arch Dis Child* 2014;99:142–6.
- Benson CA, Morahan PS, Sachdeva AK, et al. Effective faculty preceptor and mentoring during reorganization of an academic medical center. *Med Teach* 2002;24:550–7.
- Ogdie A, Sparks JA, Angeles-Han ST, et al. Barriers and facilitators of mentoring for trainees and early career Investigators in rheumatology research: current state, identification of needs, and road map to an Inter-Institutional adult rheumatology mentoring program. *Arthritis Care Res* 2018;70:445–53.
- BBSRC Innovation and Skills GroupSkills and Careers Unit. *Academic career mentoring and best practice for formal mentoring programmes*, 2016.
- Ogdie A, Shah AA, Makris UE, et al. Barriers to and facilitators of a career as a Physician-Scientist among rheumatologists in the US. *Arthritis Care Res* 2015;67:1191–201.
- Feldman MD, Arian PA, Marshall SJ, et al. Does mentoring matter: results from a survey of faculty mentees at a large health sciences university. *Med Educ Online* 2010;15. doi:10.3402/meo.v15i0.5063. [Epub ahead of print: 23 Apr 2010].
- Binkley PF, Brod HC. Mentorship in an academic medical center. *Am J Med* 2013;126:1022–5.
- Blood EA, Ullrich NJ, Hirshfeld-Becker DR, et al. Academic women faculty: are they finding the mentoring they need? *J Womens Health* 2012;21:1201–8.
- Straus SE, Johnson MO, Marquez C, et al. Characteristics of successful and failed mentoring relationships: a qualitative study across two academic health centers. *Acad Med* 2013;88:82–9.
- Jackson VA, Palepu A, Szalacha L, et al. "Having the right chemistry": a qualitative study of mentoring in academic medicine. *Acad Med* 2003;78:328–34.
- Prunuske J, Chadwell M. Medical student mentoring guide. *MedEdPORTAL* 2014;10:9861.
- Premkumar K, Wong A. Mentoring principles, processes, and strategies for facilitating mentoring relationships at a distance. *MedEdPORTAL* 2010;6:3148.
- Welch J, Palmer M, Mitchell A, et al. Faculty mentoring workshop. *MedEdPORTAL* 2014;10:9978.
- Pauly R, Lombard G, Lansang M, et al. Becoming a skilled mentor: tools, tips, & training vignettes. *MedEdPORTAL* 2014.
- Ramani S, Gruppen L, Kachur EK. Twelve tips for developing effective mentors. *Med Teach* 2006;28:404–8.
- British Society of Rheumatology. BSR mentorship scheme. Available: <https://www.rheumatology.org.uk/events-learning/mentoring>
- DeCastro R, Sambuco D, Ubel PA, et al. Mentor networks in academic medicine: moving beyond a dyadic conception of mentoring for junior faculty researchers. *Acad Med* 2013;88:488–96.
- Smith WG. Does gender influence online survey participation?: a record-linkage analysis of university faculty online survey response behavior. *ERIC Doc Reprod Serv* 2008;501717:1–21.
- Nikiphorou E, Studenic P, Ammitzbøll CG, et al. Social media use among young rheumatologists and basic scientists: results of an international survey by the emerging EULAR network (EMEUNET). *Ann Rheum Dis* 2017;76:712–5.